CLAIMS

1. An information disk recording/reproducing device, in which recording or reproduction can be performed on an information disk having an information recording track formed like a spiral or a concentric circle, comprising: a disk rotating unit for rotating the information disk; a rotational position information output unit for outputting rotational position information for the information disk of the disk rotating unit in each area provided by dividing one rotation into m (m is a natural number equal to or larger than 2); a reading unit for reading an information signal from the information disk; a radius direction driving unit for driving the reading unit in a radius direction of the information disk; a track cross detecting unit for detecting a track cross caused by crossing and generating a track cross signal based on a reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; a track cross direction detecting unit for detecting a direction of the track crossing caused by the crossing based on the reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; a counting unit for counting pulses of a track cross signal from the track cross detecting unit, with a code indicating a track cross direction from the track cross direction detecting unit, based on an output from the rotational position information output unit in each of the areas divided into m; and a control unit which rotates the disk rotating unit at a first speed, obtains a first counted value of the counting unit while making the radius direction driving unit nonoperational, rotates the disk rotating unit at one or more kinds of rotational speeds of second, third, ... rotational speeds higher than the first rotational speed, obtains second, third, ... counted values of the counting unit while making the radius direction driving unit nonoperational,

and compares a difference between the first counted value and the second, third, ... counted values with a predetermined threshold value so as to determine a maximum rotational speed of the information disk while using, as a vibration detection value, a value proportionate to a sum of absolute values of counted values obtained in the areas divided into m.

2. An information disk recording/reproducing device, in which recording or reproduction can be performed on an information disk having an information recording track formed like a spiral or a concentric circle, comprising: a disk rotating unit for rotating the information disk; a rotational position information output unit for outputting rotational position information for the information disk of the disk rotating unit in each area provided by dividing one rotation into n (n is a natural number equal to or larger than 2); a rotational position information dividing unit which further divides into k (k is a natural number equal to or larger than 1) the area having been provided by dividing one rotation into n for the rotational position information from the rotational position information output unit and outputs the rotational position information in each of $m = n \cdot k$ areas; a reading unit for reading an information signal from the information disk; a radius direction driving unit for driving the reading unit in the radius direction of the information disk; a track cross detecting unit for detecting a track cross caused by crossing and generating a track cross signal based on a reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; a track cross direction detecting unit for detecting a direction of the track cross caused by the crossing based on the reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; a counting unit for counting pulses of a track cross signal from the track cross detecting unit,

with a code indicating a track cross direction from the track cross direction detecting unit, based on an output from the rotational position information dividing unit in each of the areas divided into m; and a control unit which rotates the disk rotating unit at a first speed, obtains a first counted value of the counting unit while making the radius direction driving unit nonoperational, rotates the disk rotating unit at one or more kinds of rotational speeds of second, third, ... rotational speeds higher than the first rotational speed, obtains second, third, ... counted values of the counting unit while making the radius direction driving unit nonoperational, and compares a difference between the first counted value and the second, third, ... counted values with a predetermined threshold value so as to determine a maximum rotational speed of the information disk while using, as a vibration detection value, a value proportionate to a sum of absolute values of counted values obtained in the areas divided into m.

3. The information disk recording/reproducing device according to claim 1 or 2, wherein in each of the areas divided into m, a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

DAT [1] ~DAT [m]

(Equation 1)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation 2)

and a value proportionate to the vibration quantity is used as a vibration detection value.

4. The information disk recording/reproducing device according to claim 1 or 2, wherein in each of the areas divided into m, a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

DAT [1] ~DAT [m]

(Equation 3)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation 4)

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is determined within a permissible error range based on a maximum value of an error relative to an actual vibration quantity at this point, the maximum value being expressed by the equation below:

$$\text{ERROR} \leq 1 - \cos\frac{\pi}{m}$$

(Equation 5)

5. The information disk recording/reproducing device according to claim 1 or 2, wherein in each of the areas divided into m, a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

DAT [1] ~DAT [m]

(Equation 6)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]| \qquad \text{(Equation 7)}$$

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is set at 24 so that an error relative to an actual vibration quantity at this point has a maximum value of 1% or less.

6. A method for controlling a recording/reproducing speed of an information disk recording/reproducing device, in which recording or reproduction can be performed on an information disk having an information recording track formed like a spiral or a concentric circle, the device comprising a disk rotating unit for rotating the information disk, a reading unit for reading an information signal from the information disk, and a radius direction driving unit for driving the reading unit in a radius direction of the information disk, the method comprising the steps of: rotating the information disk; outputting rotational position information for the information disk in each area provided by dividing one rotation into m (m is a natural number equal to or larger than 2); reading an information signal from the information disk; driving the reading unit in the radius direction of the information disk; detecting a track cross caused by crossing and generating a track cross signal based on a reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; detecting a direction of the track cross caused by the crossing based on the reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; counting pulses of a track cross signal, with a code indicating the track cross direction, to obtain a first counted value in each of the areas provided by dividing one rotation of the rotational position information into m while rotating the disk rotating unit at a first speed and

making the radius direction driving unit nonoperational; counting pulses of the track cross signal, with the code indicating the track cross direction, to obtain second, third, ... counted values in each of the areas provided by dividing one rotation of the rotational position information into m while rotating the disk rotating unit at one or more kinds of second, third, ... speeds higher than the first speed and making the radius direction driving unit nonoperational; and comparing a difference between the first counted value and the second, third, ... counted values with a predetermined threshold value so as to determine a maximum rotational speed of the information disk while using, as a vibration detection value, a value proportionate to a sum of absolute values of counted values obtained in the areas divided into m.

7. A method for controlling a recording/reproducing speed of an information disk recording/reproducing device, in which recording or reproduction can be performed on an information disk having an information recording track formed like a spiral or a concentric circle, the device comprising a disk rotating unit for rotating the information disk, a reading unit for reading an information signal from the information disk, and a radius direction driving unit for driving the reading unit in a radius direction of the information disk, the method comprising the steps of: rotating the information disk; outputting rotational position information for the information disk in each of $m = n \cdot k$ areas provided by further dividing into k (k is a natural number equal to or larger than 1) an area having been provided by dividing one rotation into m (m is a natural number equal to or larger than 2); reading an information signal from the information disk; driving the reading unit in the radius direction of the information disk; detecting a track cross caused by crossing and generating a track cross signal based on a reproduction signal when the reading unit is traversed on the information recording track

by the driving of the radius direction driving unit; detecting a direction of the track cross caused by the crossing based on the reproduction signal when the reading unit is traversed on the information recording track by the driving of the radius direction driving unit; counting pulses of the track cross signal, with a code indicating the track cross direction, to obtain a first counted value in each of the areas provided by dividing one rotation of the rotational position information into m while rotating the disk rotating unit at a first speed and making the radius direction driving unit nonoperational; counting pulses of the track cross signal, with the code indicating the track cross direction, to obtain second, third, ... counted values in each of the areas provided by dividing one rotation of the rotational position information into m while rotating the disk rotating unit at one or more kinds of second, third, ... rotational speeds higher than the first rotational speed and making the radius direction driving unit nonoperational; and comparing a difference between the first counted value and the second, third, ... counted values with a predetermined threshold value so as to determine a maximum rotational speed of the information disk while using, as a vibration detection value, a value proportionate to a sum of absolute values of counted values obtained in the areas divided into m.

8. The method for controlling a recording/reproducing speed of an information disk recording/reproducing device according claim 6 or 7, wherein in each of the areas divided into m, a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

$$DAT[1] \sim DAT[m]$$

(Equation 8)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation 9)

and a value proportionate to the vibration quantity is used as a vibration detection value.

9. The method for controlling a recording/reproducing speed of the information disk recording/reproducing device according claim 6 or 7, wherein in each of the areas divided into m, a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

DAT [1] ~DAT [m]

(Equation 10)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation 11)

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is determined within a permissible error range based on a maximum value of an error relative to an actual vibration quantity at this point, the maximum value being expressed by the equation below:

$$\text{ERROR} \leq 1 - \cos\frac{\pi}{m}$$

(Equation 12)

10. The method for controlling a recording/reproducing speed of the information disk recording/reproducing device according claim 6 or 7, wherein in each of the areas divided into m,

a difference between the counted value at the first rotational speed and the counted value at each of the second, third, ... rotational speeds is expressed by the equation below:

DAT [1] ~DAT [m]

(Equation 13)

a vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation 14)

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is set at 24 so that an error relative to an actual vibration quantity at this point has a maximum value of 1% or less.